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STATE OF WASHINGTON.

ANNUAL REPORTS

OF THE

INSPECTORS OF COAL MINES

OF THE

STATE OF WASHINGTON.

1895-96.

J. H. PRICE,
SECRETARY OF STATE.

PUBLISHED BY AUTHORITY.

OLYMPIA, WASH.:
O. C. WHITE, . . . STATE PRINTER.
1897.

REPORTS OF COAL MINE INSPECTOR.

FIRST DISTRICT, 1895.

SEATTLE, WASH., January 14, 1896.

Hon. J. H. Price, Secretary of State, Olympia, Wash.:

SIR — I herewith submit my annual report for the year ending December 31, 1895, of the coal mines in the First District of the State of Washington.

Respectfully yours, DAVID EDMUNDS,
Coal Mine Inspector, First District.

SEATTLE COAL AND IRON COMPANY.

No. 1 Mine.—This mine is in a fair condition. It was closed up in the month of September. Some of the old workings were commencing to heat and give off gases, when the precaution was taken to seal up all the passages to prevent it from igniting. The coal from No. 4 is taken out through the No. 1 slope. A new pump was put in at the bottom of No. 1 which pumps the water from both mines.

No. 4 Mine.—Everything is kept in good condition. The gangways are better timbered than formerly; the timber used is much larger. This obviates the constant renewing of them, as is the case when small timber is used. A new plane was driven from the lower level to the middle one. The coal from the latter is taken down to the former and thence to the main slope. The plane is worked by gravity—the loaded cars going down draw the empty cars up. No serious or fatal accidents have occurred in it during the year. The ventilation and drainage are good. Considerable improvements have been made outside. A new boiler of one hundred (100) horse power capacity was put in. Reports of the condition of the boilers are regularly forwarded and filed.

Grand Ridge Mine.—No work was done at this mine during the year.

WASHINGTON COAL COMPANY.

This company has not done any work on their property during the year.

NIBLOCK COAL COMPANY.

Snoqualmie Mine.—Nothing further has been done than was previously reported.

CUMBERLAND COAL COMPANY'S MINE.

This mine is situated on the Skagit river near the town of Hamilton. No work has been done during the year.

BLUE CANYON COAL MINING COMPANY.

No. 2 Mine.—This mine is in a very fair condition. A new airway has been made since the explosion of April 9th, and a good volume of air is produced. It is extremely difficult to keep the air passages in good condition, owing to the character of the floor of the seam, which swells readily and contracts the airways, necessitating constant work to keep them open. It is free of any accumulations of fire damp. Drainage is fair. The fan and other machinery is operated by water power.

SOUTH BAY MINE.

This mine is situated on the south side of Lake Whatcom opposite the Blue Canyon mine. Prospecting operations have been carried on for several years. Some of the coal recently found is pronounced good, and some of it shipped to market.

ROCKY RIDGE MINE.

No new developments have been made since last report.

SKAGIT COAL & TRANSPORTATION COMPANY.

Cokedale Mine.—This mine was found in good condition throughout the year, although the volume of air was not as large the latter part as it was the first part of the year. This was owing to the seam being thinner, hence the passages were smaller; yet there was a good and sufficient volume in circulation. It is well timbered. The timber that is used in the gangway is much larger than that used formerly. The bark is taken off of it before it is taken into the mine; this renders it more durable. No serious accidents have occurred in it since it was opened, and but few minor ones. This is extremely creditable, in view of the fact that the seam is vertical and the strata friable. Nearly all the output is manufactured into coke, and the demand for this product exceeds the supply. Twenty (20) new coke ovens have been built during the year, making in all thirty (30) ovens, and they contemplate building more of them in the near future. CH_4 gas or fire damp is given off very freely, but no accumulation is ever found, as the air sweeps the face of the workings. The boilers are reported in good condition, and the certified report is regularly sent in and filed.

BLACK DIAMOND COAL COMPANY'S MINES.

No. 2 Mine.—This mine has been finished. All the available coal was taken out, and the water is allowed to fill up in it to the level of the tunnel connecting it with the No. 14 mine. The main slope from the tunnel to the surface is maintained in good condition, so as to serve as an additional opening for No. 14.

No. 12 Mine.—This mine is closed down since the month of April. A fire occurred in the pump room which communicated with the slope and ignited the timbers. All the avenues leading from the surface were sealed, in order to extinguish the fire. It is thought that the fire is out, and the management contemplate reopening it when the condition of the coal market warrants it.

No. 14 Mine.—Everything is kept in a good condition. Ventilation and drainage are well attended to, as in fact are all the details pertaining to mining. The coal is taken out very clean from the area worked. What is left in is only the needful pillars between the lifts. This is a matter of great importance to the owners and operators of mines, also to the state.

New Slope.—This is a new mine that is being opened on section 11, township 21, range 6 east, about one-half a mile from No. 14. The slope is sunk 450 feet in rock. It is well timbered and is in first class condition. The boilers were regularly examined and reports filed.

LAWSON & COMPANY.

Light Ash Mine.—This is a new mine that is being opened on section 13, township 21, range 6 east. It is a drift opening. It is in 250 feet. The coal is of a good quality and resembles the McKay seam of Franklin. No coal has yet been shipped.

DENNY CLAY COMPANY.

Kummer Mine.—This mine was found in a very fair condition throughout the year. It is a safe and satisfactory mine to work in. The ventilation is very good, considering that no artificial means are used. The roadbed is dry and well drained. The boiler is examined according to law and the reports are sent in and filed.

OREGON IMPROVEMENT COMPANY'S MINES.

Newcastle No. 1.—This is the old water level drift. The pillars have been taken out within a short distance of the Bagley tunnel. Work was commenced during the year in the May creek seam, which underlies the Bagley. It is reached by a continuation of the Bagley tunnel. A second opening was made by driving an airway on the seam to the surface. Stairs have been put in to serve as an escape in case of danger. Ventilation and drainage are good.

No. 2.—This mine was found in good condition at each inspection. Some of the rooms were being worked too far from the crosscuts. The places were well timbered and safe. There are openings into this mine, one on either side of the slope, and are provided with stairs for traveling. A tunnel was driven from the west gangway into the No. 4 seam, and an airway is being driven to the surface. When this is through it will give this mine four (4) openings to the surface, thus making it easy and safe to escape in case of fire or other accident. A barrier pillar five hundred (500) feet wide is to be left in on the east side next to the Coal creek mine, so as to keep the water of the latter from breaking in. This insures perfect safety. Ventilation and drainage are good. The former is produced by a fan fourteen (14) feet in diameter, with reversible casing, and the latter by two steam pumps.

Franklin McKay.—This mine was sealed up, owing to a fire that occurred in the slope October 14. The fire was caused by one of the employes igniting a gas blower. It has been reopened to the sixth level. A gang of men are retimbering it and putting it in condition to hoist coal. Prior to the fire taking place the mine was being put in good condition, especially the ventilation. The drainage was poor, but a new pump had arrived which would remedy it, but it had not been placed in the mine when the fire occurred.

Gem Mine.—This is a small mine, employing seven men. It is kept in a good condition.

No. 7 Mine.—This mine was closed down last year and allowed to fill up with water. The water was pumped out in November and the mine was being put in shape to work. New boilers, engine and fan are being put in place. If the plans as drafted will be executed, it will be an extensive and safe mine.

CEDAR RIVER COAL COMPANY.

Cedar Mountain Mine.—After an idleness of several years operations were resumed in the early part of December. Considerable work was done to put it in a safe and satisfactory condition before hoisting coal.

RENTON COÖPERATIVE COAL COMPANY.

Renton Mine.—This is a new slope that has been sunk during the year. It is five hundred and forty-eight (548) feet in length, on an angle of eleven and one-half (11.5°) degrees. It is well timbered and in a safe condition. Gangways have been turned east and west, and a second opening made to the surface. The ventilation is good and is produced by the heat from the pump and steam pipes heating the up-cast column of air. When the work is developed sufficiently, a fan will be erected. The drainage is effected by a steam pump. The coal is a lignite, and of a good quality. The demand exceeds the supply at present.

NAVY COAL COMPANY.

No. 1 Mine.—The ventilation, which is produced by natural means, was found to be sufficient to render it healthy. No fire-damp has been found in it.

No. 2.—This is a rock tunnel driven in at the base of the mountain to tap the seams at a lower level. No work was done on it during the year.

EUREKA COAL COMPANY.

Eureka Mine.—Two seams are being worked, Nos. 1 and 2. A rock tunnel was driven from the No. 1 seam into the No. 2; the latter overlies the former. This mine has not worked regularly, owing to the depressed condition of the trade. Ventilation and drainage are good. The air is well distributed through the face of the workings. A small trace of fire-damp has been found. The boiler is reported in good condition.

AMERICAN COAL COMPANY.

No. 1 Mine.—This mine has been idle the greater part of the summer. Ventilation is produced by natural means. It is very fair at some periods, while at others it is weak and sluggish. There being but a small number of men at work in it, no fan has yet been erected. A new airway is being made, so that they will have a greater elevation between their inlet and outlet, consequently a greater ventilating pressure. The gangway and rooms are well timbered. Drainage is good.

JOHN KANGLEY & COMPANY.

Kangley Mine.—The upper level on the north side was finished in the month of October. They were taking a skip off of the slope pillar on the south side. This should not be done until all the coal is extracted below this point, as it may cause a squeeze on the slope. The ventilation is good—a large volume was found circulating through the workings. A rock tunnel was being driven from the slope on the north side to intersect the seam, four hundred (400) feet below the upper level. The drainage is fair. The boilers were examined and are reported in good condition.

DURHAM COAL CO.

The mines of this company are still idle. No work has been done in them this last four (4) years, except some repair work.

CLE-ELUM COAL COMPANY.

Cle-Elum Shaft.—This mine is kept in a good condition. Ventilation and drainage are good. The method of working is longwall. A new fan ten (10) feet in diameter was erected during the year. The machinery, rope and boiler are reported in good condition.

ELLENSBURGH COAL COMPANY.

Gunther Mine.—This mine is located two miles from Cle-Elum. The coal is hauled by wagon from the mine to the railroad. It is not much more than a prospect. The coal is good, and the mine is in a fair condition.

ROSLYN COAL COMPANY.

The mine of this company is located three (3) miles west of Roslyn. It is slope, and is down two hundred (200) feet on an angle of fifteen (15) degrees. It is a fine seam of coal four feet and two inches thick. It is claimed that it makes good coke. The means of hoisting is by horse and gin.

No gangway has yet been turned.

SWAIN & HAIGHT.

The mine of this firm is about a mile north of the Roslyn Coal Company's mine. It is opened by an adit or drift driven in on the seam. An airway had been made and a good volume of air was circulating. The coal is good, and is the same seam that is being mined at Roslyn and Ronald.

KEELAN & WARD.

This mine has done but very little work during the year.

NORTHERN PACIFIC COAL COMPANY.

No. 1 Mine.—This mine was found in a good condition upon each inspection. The air is well taken to the face of rooms with but few exceptions. No accumulations of fire damp is found. The drainage is good. The long wall method of working was commenced in the second level, but the roof not being favorable to this method of advancing it was abandoned.

The area worked out has been cribbed and walled up in good shape.

No. 2 Mine.—Several improvements have been made during the year.. On the whole it is well ventilated, although some of the rooms are being driven too far in advance of the air current. Greater attention is given to the air passages to keep them free from obstructions than formerly, which is beneficial. The miners are well supplied with timber, and the rooms are kept in good shape.

No. 3 Mine.—This mine was closed down in the month of April. The other mines can supply the demand by working about half time. It was found in good condition when working.

MINE LAWS.

Inasmuch as several bills were introduced at the last session of the legislature, one having passed the lower house, and another the senate, I deem it proper to call attention to the one that passed the lower house, known as the Rogers' bill, which is intended as an amendment to section nine (9) of the present law. All that the amendment contemplates is that the inspector shall measure the air at each working place, which is absurd. This can be likened to the measuring of a stream of water in a conduit at a certain point, then moving on thirty (30) feet or less and make another measurement, and so continue to the end of conduit. If this bill should become a law, the inspector of the first district could not make his inspections within the prescribed time. A certain class of political orators and newspapers endeavored to make the miners of this state believe that if this bill had become a law mine disasters, such as explosions of fire-damp, would not occur. This is an insult to the intelligence of the miners. With all that human skill can do, explosions occur in the old world, as well as the new. There is no doubt but they can be lessened by proper legislation. The first and best thing to do would be to enact a law requiring those in charge of our mines to pass an examination in the theory and practice of mining. This would be the means of raising the standard of efficiency of our mine officials. Our present law, as well as the bill referred to, provides that one hundred (100) cubic feet of air per minute for each person employed in the mine, shall be in circulation. This method of basing the quantity of air for a mine is erroneous. Nearly all of the states of the union have made the same error except the states of Alabama and Maryland. If, for example, we have a mine and twenty-five persons are employed therein, by having one hundred (100) cubic feet of air for each of them we have twenty-five hundred (2,500) cubic feet per minute in circulation, the area of the passage being fifty (50) square feet, we would have a velocity of fifty (50) feet per minute or five-sixths ($\frac{5}{6}$) per second. This would be entirely too slow a movement. The air current should not be less than three or four feet per second in any mine. The above plainly shows to every practical miner the fallacy of such a basis.

BLUE CANYON MINE EXPLOSION.

Between two and three o'clock in the afternoon of the 9th of April an explosion occurred, causing the death of twenty-three (23) persons. Upon my examination the following day, I found that a hole had been drilled in the bottom rock, at the face of the gangway, and it had been charged with giant powder and fired. The hole had been drilled in a very improper place. Instead of drilling it in the direction of the gangway and making it a lifting shot, it was located on the top of the rock, or across the strata, and pointing into the solid, thus making a line of great resistance. The explosive failed to perform the work intended for it, merely making a small cavity on the face of the rock. Such a shot would cause a great concussion, similar to a blown-out shot.

It was stated that the mine was free from gas that morning when the fire-boss made his examination, but it is probable that gas was present when the shot was fired, or a quantity of it was liberated from the strata with the blast, and the heat produced by the stowed up energy of the giant powder—when it failed to perform work in removing the rock—must have ignited a pocket or a blower of gas. According to the testimony of the men working on the opposite shifts and some of the officers of the company, rumbling noises were heard the day previous, similar to that of water flowing in a subterranean channel, under the floor of the gangway; also a rapping. These noises indicated that there was gas in the strata under pressure. Special precautions should have been taken in firing blasts under such conditions. Considerable fire-damp is given off from the floor of the mine at all times, as there is a seam f dirt underlying the one they work, and the hole had been drilled nto it. It was evident that there was not a large quantity of fire-amp present, as but few of the bodies were burned, and on those at were the burns were not sufficient to cause death, according o the statement of the physicians that examined them.

I found some clothing near the seat of the explosion and it was ot burned. This proves that the flame was not very intense; either did it extend very far. This explosion presents some very culiar features, inasmuch as the men were not fatally burned, at asphyxiated by gas, and injured by the force, for any one acuainted with the mine would expect that those in the gangway ould be badly burned. The bodies of the men that were at work the rooms were all found in the gangway. They, no doubt, enavored to escape by coming down from the rooms to the gangay. This was a fatal mistake, for in so doing, they came in ntact with the dense after damp, which was yet hot, and perished it. One of the men who escaped stated that he and his partner, hen they felt the shock, immediately started down the chute to e gangway. As soon as they reached the gangway their lights ent out. His partner fell and perished, while he, with difficulty, ade his way outside. He and a driver were the only ones who escaped with their lives from the mine. It was quite evident from his testimony that had the miners working in the rooms remained in them they would have been saved, as a rescuing party was able to go into the face of the works in a very short time. The ventilation had been destroyed by the force, blowing out the stoppings between the intake and return. It is of the utmost importance that more attention be paid to the charging and firing of blasts in the coal mines of this state, or calamities of this kind will occur. The only preventative from overcharged or misdirected shots is to select shot firers who shall fire all blasts when the men have finished their day's work; and if, in their judgment, the charge of powder is too great, or the hole too strong, they should refuse to fire them, and in no case should they fire them if there be an accumulation of fire damp, even in small quantities. All places should be thoroughly ventilated, so that they will be clear of fire damp, and if the mine is dry and dusty it should be sprinkled with water. If the above precautions are taken, explosions in our mines will be reduced to a minimum. The amount of air in circulation in that part of the mine varies from nine thousand (9,000) to eleven thousand (11,000) cubic feet per minute at the end of tunnel, and at the face of gangway from fifteen hundred (1,500) to two thousand six hundred (2,600) cubic feet per minute. This ought to keep it in a safe condition under ordinary circumstances, as it is a small mine, there being but eight (8) rooms working in it at the time of the explosion, hence the air had but a short distance to traverse. Great care should be exercised in penetrating into new ground, where there is but one mine, as the adjacent strata is being drained of gas through the workings of said mine, and sudden outbursts of gas are liable to occur and cause an explosion in well ventilated mines.

FRANKLIN MINE EXPLOSION.

An explosion of fire damp occurred between 2 and 3 o'clock in the afternoon of the 26th of June, when four persons were seriously burned and one fatally burned. The latter died from his injuries in two days. These men were employed in driving up the main slope from the seventh to the sixth level. The previous shift had fired two blasts before going home, and it is quite probable that the air passages had become impaired by the blasts so than an accumulation of fire damp occurred. The men that were to commence work went up into the slope with naked lamps, the leader having a safety lamp in his hand and a naked one in his cap, thus igniting the gas. These men were the victims of the folly of the leader, it being a rule to examine the place at the beginning of each shift with a safety lamp to ascertain if any fire damp was present. An excellent volume of air was found to be in circulation usually. When these men were taken out the foreman with several other men went into the place to repair it. Several gas blowers were found burning, which they succeeded in extinguishing. The foreman was warned by the other men that there were other blowers burning further up, but unheeding the warning he replaced a door that had been blown down, thus restoring the ventilation, when another explosion occurred, fatally injuring the foreman and slightly burning three others. It was evident that gas had accumulated at the face, and when the door was replaced and the air commenced circulating around the face the gas was removed and brought in contact with the burning blowers and ignited. The action of the last party was as rash and careless as the first. They ought to have been positive that nothing was burning, and if there was it should have been extinguished before restoring the ventilation.

FRANKLIN MINE FIRE.

A fire occurred on the morning of the 14th of October, when four men lost their lives. One of the men working in the main slope ignited a gas blower, the flame reaching the lumber and timber in the slope, causing it all to burn. The men were all notified to come out, and they reached the surface safely. Some of them, after reaching the point where the fire was, remained to try to extinguish it, but their efforts were in vain. The smoke from it was escaping to the sixth level and was carried by the air current to the auxiliary slope to the seventh level, compelling the men to retreat. Two men were then sent up to the sixth level to shut a door on the gangway between both slopes, to prevent the smoke from being carried to the seventh level. They were unable to do this and were compelled to retreat to the surface.

The four men that lost their lives were warned by their fellow workmen not to go down the slope, but their warning was unheeded. They gave the signal to the engineer to lower them down. When the trip reached the bottom a large volume of smoke issued from the mouth of the slope. The engineer then determined to hoist the cars up, as it was impossible that anyone could live in the slope, but the cars were found to be empty. It was impossible for anyone to attempt to recover their bodies. The slope was sealed up, so as to prevent the fire from making further headway.

NON-FATAL ACCIDENTS, 1895.

1. January 16—Jere Conelly, Cokedale; leg broken by rock falling on him.

2. January 25—Hudson Miles, Franklin; injured by a fall of coal.

3. June 6—Peter Thompson, Newcastle; leg broken by being caught between locomotive and car.

4. June 12—Peter Frazier, American mine; slightly burned by gas.

5. June 27—Wm. H. Cleaves, Charles Leander, W. P. Johnson, Chas. Johnson, Alf. Linquist and Gus Johnson, Franklin; burned by an explosion of fire damp.

6. August 27—John Raymond, William Davies and Watkin Evans, Black Diamond No. 14; slightly burned by an explosion of fire damp.

7. September 29—Nels Anderson, Blue Canyon; arm fractured by rock falling on him.

8. October 19—Frank Costa, Cokedale; burned by an explosion of fire damp.

9. November 12—J. H. Duncan, Blue Canyon; collar bone broken by being caught between car and timber.

13. Wm. A. Hart, Roslyn; ankle broken.

14. C. Anderson, Roslyn; leg broken.

15. John Miller, Roslyn; arm broken.

16. John Wearmouth, Roslyn; leg broken.

17. James Prosser, Roslyn; back injured.

FATAL ACCIDENTS, 1895.

1. Wiley Hamer, age 52 years, single; killed by falling down a chute in Franklin mine.

The following persons were killed in the Blue Canyon mine April 8th by an explosion. Nearly all of them were suffocated by the after damp:

2. D. Y. Jones, superintendent of mine, age 38 years, married.

3. Andrew Anderson, miner, age 35 years, single.

4. Thomas F. Conlin, miner, age 25 years, single.
5. E. P. Chase, miner, age 40 years, single.
6. Martin Bloom, miner, age 28 years, single.
7. Charles Carlson, miner, age 28 years, single.
8. Philip Dinkle, miner, age 25 years, single.
9. William Evans, miner, age 40 years, single.
10. Alex. Hendrickson, miner, age 30 years, single.
11. James Kirkby, miner, age 36 years, single.
12. Lucas Latoka, miner, age 25 years, single.
13. William Lyster, miner, age 30 years, single.
14. John A. Morgan, miner, age 50 years, widower.
15. Benjamin Morgan, miner, age 55 years, widower.
16. J. J. McAndrews, miner, age 40 years, married.
17. J. D. McNulty, miner, age 42 years, single.
18. Samuel Olson, miner, age 30 years, single.
19. Henry Ravet, miner, age 28 years, single.
20. George Roberts, driver, age 20 years, single.
21. Carl A. Remberg, miner, age 30 years, single.
22. Charles Silverson, miner, age 30 years, single.
23. John Z. Williams, miner, age 46 years, widower.
24. Michael Zelinski, miner, age 40 years, married.
25. Park B. Robinson, mine foreman, age 35 years, married.
26. Chas. Anderson, miner, age 25 years, single.

All were fatally injured by an explosion of fire damp in the Franklin mine June 27th.

27. R. M. Gibson, fireman, age 40 years, married.
28. Philip Early, fireman, age 45 years, single.

Were fatally injured by a boiler explosion at the Franklin mine October 4th.

29. Hans Jenson, fire boss, age 28 years; fatally burned by an uplosion of fire damp (CH_4) in Franklin mine November 9th.

30. Evan J. Thomas, fire boss, age 52 years, married; fatally injured by being run over by a trip of cars in Mine 14, Black Diamond, November 13th.

Total number of fatal accidents, six (6).

Total number persons killed, thirty (30).

Total number non-fatal accidents, seventeen (17).

Total number persons injured, twenty-four (24).

EMPLOYES.

Name of mine.	*Inside.*	*Outside.*
American	7	2
Black Diamond No. 14	134	41
Black Diamond, new slope	12	8
Cle-Elum	15	5
Cokedale	41	16
Denny	25	5
Eureka	23	4
Franklin, McKay Franklin No. 7 Franklin, Gem	186	69
Gilman	175	65
Kangley	20	5
Newcastle No. 1 Newcastle No. 2	151	47
Navy	10	5
Roslyn Nos. 1 and 2	426	1[illegible]8
Roslyn No. 3	235	41
Ellensburg	5	2
Swain & Haight	5	2
Roslyn Coal Co.	2	....
Keelan & Ward	2	....
Blue Canyon	46	10
Cedar Mountain	15	5
Totals	1,568	4[illegible]

THE QUANTITY OF AIR MEASURED IN EACH MINE.

Name of mine.	*Cubic ft. per min.*
Black Diamond No. 2	10,300
Black Diamond No. 12	22,400
Black Diamond No. 14	27,500
Blue Canyon	12,540
Cokedale	12,650
Cle-Elum	9,230
Eureka	10,700
Franklin, south fan	18,500
Franklin, north fan	29,800
Gilman No. 1	17,500
Gilman No. 4	12,240
Kangley	11,000
Newcastle No. 1	10,800
Newcastle No. 2	35,740
Navy	4,000
Renton	11,000
Denny	7,500
Roslyn No. 1	58,040
Roslyn No. 2	56,280
Roslyn No. 3	23,720

AMOUNT OF COAL MINED DURING THE YEAR 1895.

KING COUNTY.

Name of company.	*Tons.*
American Coal Co. (estimated)	3,500
Black Diamond Coal Co	115,028
Cedar River Coal Co	500
Denny Clay Co	6,500
Eureka Coal Co	8,000
Seattle Coal & Iron Co	92,879
John Kangley & Co	7,190
Navy Coal Mining Co	3,347
Oregon Improvement Co. (Newcastle)	79,827
Oregon Improvement Co. (Franklin)	70,584
Renton Coöperative Coal Co	2,420
KITTITAS COUNTY.	
Cle-Elum Coal Co	7,745
Ellensburg Coal Co	1,000
Keelan & Ward	200
Roslyn Coal Co	400
Swain & Haight	450
Northern Pacific Coal Co	267,176
SKAGIT COUNTY.	
Skagit Coal & Transportation Co	20,276
WHATCOM COUNTY.	
Blue Canyon Coal Mining Co	28,764
Total	715,786

FIRST DISTRICT, 1896.

SEATTLE, WASHINGTON, January 4, 1897.

Hon. J. H. Price, Secretary of State, Olympia, Wash.:

SIR—I have the honor of presenting herewith my annual report as inspector of coal mines for the First District, for the year ending December 31, 1896. The report contains the usual statistics. It gives me pleasure to state that the number of fatal accidents is less, for the number of tons of coal mined, than ever before in this district. The ratio of production to loss of life will compare most favorably with other coal fields of a similar character. There have been six fatalities; three of them were due to either the carelessness or recklessness of the victims, while the other three appeared to be unavoidable. Of the ten non-fatal accidents six were of a very trivial nature; four persons were severely injured, one of them permanently disabled while trying to jump upon a car that was being hoisted rapidly in a slope, which is forbidden. The subject of splitting the air current is dealt with, and we trust that those who are interested, and may legislate upon the subject, will read the remarks and give them due consideration.

Yours very respectfully, DAVID EDMUNDS,
Inspector.

CONDITION OF MINES—KING COUNTY.

BLACK DIAMOND COAL COMPANY MINES.

No. 14 Mine.—Only one seam is being worked at present. The mining of the coal is confined to the fifth level. The other levels are kept open and in repair. Each side of the level is ventilated by a separate split of the air current. The volume of air measured on each side was as follows: West, 11,492 cubic feet per minute; east, 6,240 cubic feet per minute. A good volume was found at the face of gangways, and it was well distributed through the rooms. A new airway was being made from the face of the east side to the third level, in order to increase the quantity of air on that side, although they had ample. The working places are well timbered and kept in good condition. The drainage is good, and the road-beds are kept dry and clean, which is necessary for good haulage.

Morgan's Slope.—This is a new mine. It is down twelve hundred feet, on a pitch of 22 degrees. It is well timbered and in good condition. They commenced to turn off gangways at a distance of four hundred feet, but they were afterward stopped. The local management decided to continue to sink the slope to the boundary before mining any coal. This certainly is a step in the right direction. If other companies had adopted this method a great deal of valuable coal that now is burning in the bowels of the earth, in this state, could have been mined and shipped. Fire-damp (CH_4) is given off very freely. A large volume of air is forced down.

No. 12 Mine.—This mine is sealed up since the slope caught on fire. Number of inspections during the year was five.

LAWSON COAL COMPANY.

Light Ash Mine.—This mine is on the adjoining land to Black Diamond No. 14. The coal is of a fine quality, and is no doubt the McKay seam on the opposite dip to Franklin. It was idle for several months in the fall, but they have again resumed operations. A new fan was erected but it is not used in the cold weather, as a large volume of air is produced by natural means. Upon my last visit I requested the superintendent to stop the gangway until the chutes that were then driven were connected by cross cuts, so that the air current could be conducted nearer the face. He complied with my request. Air measured at intake, 11,400 cubic feet per minute; at the inside cross cut, 3,744 cubic feet per minute. Fire damp (CH_4) is given off freely. I advised them to be careful in regard to it, as I was informed that the men were careless about the matter. The working places are well timbered. Drainage is good. New bunkers have been built and they are shipping coal. A number of houses have been built by the employes, and a new mining camp is added to the list in the state. Number of visits to the mine during the year was five.

OREGON IMPROVEMENT COMPANY'S MINES.

Newcastle Slope.—There are three seams being worked in this mine, namely: Nos. 2, 3 and 4. I found everything in good condition upon each of the five visits. The east side of No. 2 is ventilated by utilizing the heat from the steam pipes in the upcast airway. The volume of air produced by that means was 8,800 cubic feet per minute. It is well distributed through the workings; a good volume was found at the face of each gangway. Nos. 3 and 4 are ventilated by a fan. The volume measured at the downcast was 35,400 cubic feet per minute. No. 4 seam has had a new opening made to the surface. Stairs have been put in it, so as to serve as an exit in emergencies. The rooms are well timbered and in a safe condition. Drainage is good.

May Creek.—This seam is being worked by a tunnel made from the old water level. It formerly was ventilated by natural means, but this was found inadequate at various times. A fan was erected in the early part of the year, so that mechanical means could be used when the natural force would be too weak, to give sufficient ventilation. It was found in a safe condition, and well drained.

Franklin Slope.—This mine has been abandoned, owing to the fires in it. The pumps, pipes, rails and cars were taken out, and the mine allowed to fill up with water.

No. 7 Mine.—Work is prosecuted in two levels. The west gangway of the first level has been stopped, as the coal did not prove very good. The distance not being very far to No. 12 mine of the Black Diamond Coal Company, it was thought best to stop it and leave a good barrier pillar between both mines. A very poor method of conducting the air had been adopted, the current returning to the fan before circulating to the innermost places. Upon three occasions during the year I requested the removal of the men from the gangway and some of the inner chutes until the air current would be brought nearer to the face. Upon my last visit, I found a change being made that would conduct the air directly into the face of the gangway. The volume of air at the downcast was 25,000 cubic feet per minute. A number of rooms on the west side of the lower level had caved, a crush had been brought on; the pillars were made too small. A large quantity of timber had been put in, but would not hold it. A new hoisting slope has been made, the other slope is to be used as an auxiliary. New hoisting engines, boilers and fan have been put in place. Drainage is good. Number of visits made was seven.

Gem Mine.—This mine is a small one. From two to six men are employed in it. It is ventilated by natural ventilation, which is ample for the number of men. No fire damp given off in it.

SEATTLE COAL & IRON COMPANY'S MINES.

No. 1 Slope.—The coal from the second and third levels of the No. 4 seam is hoisted to the surface through this slope. No work is done in the No. 1 seam. I found this mine in a fair condition upon each of my visits. The greatest cause for complaint has been the condition of the cross cuts, which are allowed to become filled up with coal and refuse, thus obstructing the air current. Some of them are made too small; it seems to be a very hard matter to get the miners to make them as large as they ought to be. The lower level was in a good condition the last time I visited the mine. The amount of air at the downcast was 17,460 cubic feet per minute, and a fair current was found at the face of the gangway. The second level gangway was not in as good a condition as the lower one; as to ventilation, the rooms were in good condition. The gangway was being driven too far between breakthroughs. There was a difference between the foreman and the men as to building a brattice. It would be for their benefit to do so. I requested the foreman to have it done.

No. 4 Mine.—This is the water level workings. A new counter gangway is being driven, and a new opening was made in it to the surface. The ventilation was fair. I requested the foreman to have the cross cuts cleaned up, so as to improve the ventilation. The rooms as a rule were well timbered. The drainage is fair. The machinery is kept in good condition. The boilers are regularly examined and reported in good condition.

CEDAR MOUNTAIN COAL COMPANY.

No. 1 Slope.—The coal is being mined by working across the pitch. A subterranean slope is sunk from the first level of the main slope, and rooms are turned on each side. Air measured at the downcast was 7,500 cubic feet per minute. It was not as well distributed through the rooms as it should be. I notified the superintendent of it, and to make some changes in the system, which he did. The places were very well timbered. The roof is very friable, and it requires care and prompt timbering to keep it from caving. Small quantities of fire damp (CH_4) have been found at various times. Drainage is good. Boilers are reported in good condition.

RENTON CO-OPERATIVE COAL COMPANY.

No. 1 Slope.—The two gangways have been stopped. The south gangway was approaching the old mine. They were notified to keep drill holes in advance of the face. Instead of doing so they decided to stop the gangway, as they were not prepared to cope with the water from the old mine should they tap it. The slope will be sunk to the depth of another lift in the near future.

The volume of air measured at the downcast was 11,400 cubic feet; at inner cross cut 2,800 cubic feet per minute. Drainage is fair. The rooms are well timbered and in good condition. The roof is soft and friable. New hoisting engine and boiler have been put in. Preparations are being made to build new bunkers. The boilers are reported in good condition.

This coöperative venture seems to be in a fair way to succeed, as it deserves to be. The company is composed mainly of miners. Many of them are good, capable men.

DENNY CLAY COMPANY.

Kummer Mine.—Work has been suspended here for the last four months, but it is thought that they will resume operations shortly. The coal of this mine is used at the factory. The factory having to close down for the want of orders caused the shutting down of the mine. It was found in a fair condition throughout the year. Amount of air in circulation, 9,400 cubic feet per minute. Every place was kept in a safe and healthy condition. The boiler is reported in good condition.

NAVY COAL COMPANY.

Navy Mine.—The new tunnel which had been commenced last year was completed the past year. The ventilation is dependent upon natural forces, and a good volume is produced when the weather is either cold or warm, but when the temperature of the mine and the outside atmosphere are nearly equal, there is very little movement in the air column. This is the case in all mines depending upon natural ventilation. They do not work very regular except in winter time. The places are well timbered, and comparatively safe. Drainage is good. No fire damp (CH_4) has been found.

EUREKA COAL COMPANY.

Eureka Mine.—No work has been done during the year.

CARBON COAL COMPANY.

American Mine.—New coal washers were put in to wash the coal and separate the refuse from it, which has resulted in a greater demand for the product of the mine. The condition of the mine was very good the last time I visited it. The same can be said of this as of the Navy in regard to the ventilation. A small quantity of fire damp has been found. The timbering and drainage are good.

DANVILLE COAL COMPANY.

Davis Mine.—This is a new mine and was opened during the year, although some prospecting had been done for some time prior. A tunnel was driven through the measures to the coal and a gangway driven a short distance in it. A second opening was made for ventilation. It seems that it is not much more than a prospect yet, although a small quantity of coal was shipped. Work was suspended in September, and the mine has remained idle since.

NORTHERN PACIFIC COAL COMPANY.

Kangley Mine.—The lower level, which had been abandoned and allowed to fill up with water, has been drained. Preparations are being made to sink the slope for another lift. Large quantities of fire damp was found in the old workings after the water was pumped out. The airways were cleaned up and the air current forced through the workings clearing them of all accumulations of gas. Fire damp is given off very freely from the coal and surrounding strata. The working places are well ventilated—a good current is conducted through the faces. The volume in circulation upon my last visit was 12,800 cubic feet per minute. The places are well timbered. Drainage is good. The boilers were examined and reported in good condition.

CONDITION OF MINES—KITTITAS COUNTY.

NORTHERN PACIFIC COAL COMPANY.

Roslyn No. 1.—This mine was found in good condition upon each of my five visits. The last time I found some changes had been made in the system of ventilation which met my hearty approval. I had suggested the same change at one time to the former manager, but he did not wish to utilize the new shaft for ventilating purposes. It was done by the new manager without any suggestion from me. The change is in accord with the correct principles of mine ventilation, and it shows that those principles are comprehended.

The air was well distributed through the working faces. The volume of air as measured is as follows: West split, 21,037.5 cubic feet, and east split, 15,600 cubic feet per minute. The timbering and drainage are well attended to. No standing gas was found.

No. 2 Mine.—Everything was found in a satisfactory condition as a whole. Several rooms were in need of cross cuts, and in each instance the foreman would order the men to drive one. In some of them the men had been told previously to do so, but neglected to do it, preferring to wait for idle time to perform such work, so that they could keep up their output.

The volume of air as measured at the lower intake was 18,440 cubic feet, and at the upper or east intake, 17,100 cubic feet per minute. It is well divided into the various entries or gangways. An ample supply of timber was found in the rooms, and as a rule they were properly propped and secure. The reports of the fire bosses show that the working places are kept free from any accumulation of fire damp, and I found them so, thus verifying their reports. Drainage is good. Some change is being made in the system of mining by laying out the work so that the pillar coal can be recovered, which was heretofore left in and lost. This is a question of great interest to the owners and operators of mines, and in my opinion, to the state, that the amount of coal taken out be as great as possible from the area worked, consistent with safety. It is true that in many of our mines wasteful methods were adopted, and that over one-half of the coal was lost, never to be recovered.

Many necessary improvements are being made on the outside.

No. 3 Mine.—No work has been done here during the year. The other mines are more than able to supply the demand.

Shaft.—No coal has yet been hoisted through it. It is used as a downcast, and for the drainage of No. 1 Mine.

CLE-ELUM COAL COMPANY.

Shaft.—This mine is worked by the long wall method and it is apparently successful. The only drawback is that they do not have enough refuse to form good pack walls, a large number of timber cogs have to be put in instead. All the coal is taken out of the territory worked. The ventilation is good and is kept up to the face. The volume at the foot of the shaft varies from 10,030 to 6,400 cubic feet per minute. The fan could be run much faster if necessary, but they have ample air for such a small mine. The second opening is not yet completed. I have urged them to do so as soon as possible. The company is made up of four practical miners, and the expense of opening up of that kind of a mine has been heavy, hence the reason for not completing the second opening. The number of men at work is fifteen (15), which is nine (9) less than the limit allowed by the law, until said opening is made. A little fire damp is given off. It is well drained and timbered.

ELLENSBURG COAL COMPANY.

Gunther Mine.—Some work was done at various times during the year. The number of men not exceeding six (6) and sometimes only two were at work. It is a drift opening, and is only a short distance in.

KEELAN & WARD.

They have two drifts opened on each side of the seam, with openings for ventilation. Two men work in it, periodically.

SWAIN & HAIGHT.

This firm work a few men occasionally in their mine. It is a drift opening, with an opening made for ventilation.

ROSLYN COAL COMPANY.

This is a small slope that is down about two hundred (200) feet. The coal was hoisted by a horse and gin. Two men work in it at intervals.

CONDITION OF MINES—SKAGIT COUNTY.

SKAGIT COAL & TRANSPORTATION COMPANY.

Cokedale Mine.—This mine was found in a good condition upon each of my five visits. The ventilation is well conducted through the workings. The volume of air in circulation was 16,420 cubic feet per minute. The working places are kept free from any accumulations of fire damp, although it is given off very freely. The timber in the west gangway was being crushed badly, and they were being renewed. Drainage is good.

Ten (10) new coke ovens were built during the year, making a total of forty (40). The demand for coke greatly exceeds the supply. A new shaft is to be sunk and more ovens erected in the near future. The boilers are reported in good condition.

CUMBERLAND COAL COMPANY.

Hamilton Mine.—No work has been done in it during the year.

CONDITION OF MINES—WHATCOM COUNTY.

BLUE CANYON COAL MINING COMPANY.

Blue Canyon Mine.—The first level of the new tunnel is exhausted. A new slope is being sunk and is down a distance of two hundred and fifty (250) feet at the end of the tunnel. The seam is good, and is six feet thick, all clean coal. I found everything in a safe condition. The air in circulation varies from 11,000 to 5,000 cubic feet per minute. The new slope is well timbered and in good condition. They were making preparations to turn off the gangways when I was at the mine, December 29. The fan was not being run at that time, as they had enough of a natural current for the small amount of work that was being done. When the new work will be opened up a greater number of men will be employed and the output increased. Drainage is good. Boilers are reported in good condition.

SOUTH BAY COAL COMPANY.

This company has done considerable work prospecting, but nothing of a permanent nature is yet made. At present four men are at work.

ROCKY RIDGE COAL COMPANY.

This company has not done any work at their mine during the year.

SPLITTING THE AIR CURRENT—OR BUDDLE'S METHOD.

Inasmuch as bills, or at least the same bill, was introduced at each of the legislative sessions of 1893 and 1895, for the purpose of compelling a split of the current to be made at each level in the mine, a few remarks upon the subject may be appropriate. It is evident that the question is not comprehended by some managers of companies that operate mines, as well as our legislators. I will cite a statement of one manager in reference to this bill when pending at the session of 1895: "If this bill becomes a law, we will not be able to operate our mines, for we cannot comply with its provisions." He was either misinformed or did not understand the question. Each of the mines of this company had but one level working in them, and the air current was split, or rather divided, at the bottom, so that each side or half of a level had a split, which was double the requirements of the bill. All the mines of this district west of the Cascade mountains have a split for each side of a level, and such a law would not affect them. It is folly for anyone to believe that a split for each level would prevent explosions, as has been stated. Would to God it might! then the question of preventing mine explosions would be an easy matter. The Blue Canyon mine, in our own state, had a split for each side, or half, of a level, yet an explosion occurred, and explosions are occurring frequently in other states of the union and in the European countries, where the question of ventilation has received deep and thoughtful study. If the author of said bill intended that the splits should be proper or technically correct ones, then it would be hard to comply with its provisions; but if it is a division of the current that is meant, then it is done at present, as already stated. A proper split is one wherein all the splits leave the downcast or intake airway at the same place and join the return airway, or upcast, together; they must likewise have equal lengths, areas and rubbing surface, so as to offer an equal amount of resistance. This cannot practically be done in mines. The current can be divided so that the various districts in a mine are ventilated separately, and this is commonly termed a split. Care should be taken not to split the current too often or it will become too feeble, and the danger increased rather than diminished. I am in favor of a law providing for the splitting of the air current, when necessary, but not to confine it to one level. A level, without any other consideration, is not a proper basis to determine the number of splits required in a mine. There are many gaseous mines where a group of breasts or rooms must be ventilated separately, and the air is then conducted to the return, and a number of splits are made in the one level. It would be extremely dangerous to have but one split in each level in those mines. Anyone having worked in the deep mines of Pennsylvania, or Europe, knows this to be true. For the benefit of those who may be interested in this question and who may intend to legislate for it, I will enumerate the points that should be considered in determining the number of splits to be made:

1. The extent of the territory being worked. 2. The amount of fire damp and other gases given off. 3. The amount of powder used in blasting. 4. Number of persons and animals at work. The number of spilts must be limited to the capacity of the fan, or the power producing the ventilation, so that the face current may not have less than five (5) feet per second of a velocity.

In the matter of mine legislation there are many things that should be provided for as well as ventilation, although that is the most important subject. A provision should be made for the hoisting and lowering of persons into the mines that are worked by slopes. A car should be constructed for that purpose only, with bridle chains attached, as they are much safer than a single chain. Some of the companies already have such a car and appliance, and there is no reason why all of them should not do so. If such a provision had been made in the past, some lives might have been saved. The distance between cross cuts and the size of the same should be regulated, as the tendency is to go too far and make them too small. The question of barrier pillars should be provided for, between properties. Some of the mines are working towards old abandoned mines, which may be a source of trouble in the future. A copy of the maps of the mines should be furnished to the inspector, and not to the secretary of state, as at present. The foremen and fire bosses should be competent men, and should be examined by a board of examiners as to their fitness for such positions. This is done in nearly all of the states that mine coal in British Columbia and the European countries. As a matter of safety to the employes it is of the greatest importance; and what adds safety to the persons employed, does the same to the property. There are a number of instances where men have been employed for the positions named, to my knowledge, in this state, that were totally unfit to act as such. It is very wrong that men who know nothing about gasses or the principles of mining or ventilation, should be employed to supervise a mine where many lives are dependent upon them. Some of them have brought on their own death, as well as the death of others. A law providing for this would do more towards lessening accidents than anything else. Senate bill 358 was introduced at the last session of the legislature for that purpose.

FATAL ACCIDENTS.

1. January 9.—Marcelleno Plaino, a miner, age 35 years, single; fatally injured by rock falling upon him in the west gangway of mine 14, Black Diamond. He and his partner had fired a blast and they had retreated to a place of safety until the shot went off, when he immediately returned to see the result of the blast. A piece of rock fell upon him. He died in two hours after. His

partner stated that he warned him not to return until everything had settled from the shock caused by the blast, but he insisted upon going. Coroner's jury rendered a verdict of accidental death.

2. March 23.—Charles Coutts, a miner, age 46 years, married; fatally injured by rock falling upon him in mine 4, Gilman. He and his two sons were working together in a room. He was in the act of digging a hole in order to place a post under the rock which he knew was unsound, when it fell, crushing him. Coroner's jury gave a verdict of accidental death.

3. April 7.—Peter Jacobs, a miner, age 40 years, single; killed by a fall of coal in the Blue Canyon mine. He and his partners were retimbering a chute, when the coal fell, covering him. It was twenty hours before they were able to recover his body, and life was extinct. He was apparently suffocated; no injuries were visible upon his body, and the coal covering him was small and fine. No inquest held.

4. April 18.—Oscar Johnson, a miner, age 27 years, single; killed by a fall of rock in mine 4, Gilman. He and his partner had newly entered the room to commence work on the night shift. His partner was sounding the roof to ascertain if it was safe. While the deceased commenced to shovel the coal in the chute he was told that it was unsafe to remain where he was, but he unheeded the warning. This seemed to be a case of too much anxiety to get coal out without due regard to safety.

5. July 28.—Thos. E. Lewis, a miner, age 50 years, widower; was instantly killed by a rock falling from the roof in his room in mine 2, Roslyn. He was at work mining the coal when the rock fell close to the face. A slip run across the room in the roof, which he probably could not detect. The room was well timbered. He was a practical miner and had a large experience in mining. Coroner's jury rendered a verdict of accidental death.

6. September 15.—John Allen, a miner, age 30 years, single; fatally injured in mine 2, Roslyn, by a fall of rock. The room was well timbered and a supply of timber was on hand. This was another case of a clay slip in the roof, and which cannot easily be detected. An inquest was held and the jury rendered a verdict of accidental death.

NON-FATAL ACCIDENTS.

April 14.—Nels Heldman, a miner, slightly burned by igniting a small quantity of fire damp in mine 2, Roslyn.

May 28.—James Kitchen, a miner, received slight injuries by falling rock in mine 2, Roslyn.

June 10.—Lyman Phillips, a miner, was severely injured by jumping upon a car in motion on the slope in the Kangley mine.

July 2.—J. B. Delaney, a miner, fell from a car in motion, fracturing the small bone of his leg, in mine 2, Roslyn.

September 25.—William Woods, a surveyor, Sanforth Thornsby and John Green, company men, were burned by igniting the fire damp in the old workings. The first named was severely burned, the last two slightly.

November 18.—Chas. McKinnon, a driver boss, was severely injured by being caught between a car and a chute in mine 14, Black Diamond.

December 9.—Frank Lawson, a mine foreman, and Louis Lavati, a miner, were burned by igniting the fire damp in the Light Ash mine. The first slightly, the last severely.

SUMMARY OF ACCIDENTS.

Number of fatal accidents	6
Number of lives lost through said accidents	6
Number of non-fatal accidents	7
Number of persons injured through said accidents	10

CAUSES OF FATAL ACCIDENTS.

Killed by falls of rock	5
Killed by falls of coal	1
Total	6

CAUSES OF NON-FATAL ACCIDENTS.

By cars in motion	3
By explosions of fire damp	6
By fall of rock	1
Total	10

NUMBER OF PERSONS EMPLOYED.

Name of mine.	*Inside.*	*Outside.*	*Total.*
Black Diamond No. 14	133	45	199
Black Diamond, Morgan Slope	13	9	
Light Ash	24	4	28
Franklin No. 7	148	56	211
Franklin Gem	6	1	
Newcastle Slope	140	....	231
May Creek	85	51	
Cedar Mountain	20	7	27
Renton	22	8	30
Denny	14	5	19
Carbon	16	4	20
Navy	15	7	22
Kangley	24	13	37
Danville	8	2	10
Gilman No. 4	245	45	290
Roslyn No. 1	112	....	577
Roslyn No. 2	414	51	
Cle Elum	17	4	21
Ellensburg	4	2	6
Swain & Haight	3	1	4
M. McColgan	4	1	5
Keelan & Ward	2	1	3
Blue Canyon	26	8	34
South Bay	4	2	6
Cokedale	57	20	77
Totals	1,504	347	1,851

COAL MINED DURING THE YEAR.

Name of company.	*Tons coal.*
Black Diamond Coal Company	100,337.19
Lawson & Co.	11,000
Oregon Improvement Company, Franklin mines	56,063
Oregon Improvement Company, New Castle mines	125,337
Cedar River Coal Company	20,000
Renton Coöperative Coal Company	7,000
Denny Clay Company	3,500
Carbon Coal Company	8,500
Navy Coal Company	1,700
John Kangley & Co	1,519
Danville Coal Company	500
Seattle Coal & Iron Company	158,836.6
Northern Pacific Coal Company	255,358
Cle-Elum Coal Company	8,420
Ellensburg Coal Company	1,200
Swain & Haight	300
M. McColgan	420
Keelan & Ward	240
Blue Canyon Coal Mining Company	12,000
Skagit Coal & Transportation Company*	18,000
Total	773,236.79

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*Coke, 15,000 tons.

NUMBER OF MINES AND PRODUCTION BY COUNTIES.

Name of county.	*No. of mines.*	*Tons.*
King	15	474,298.79
Kittitas	7	265,938
Skagit*	1	18,000
Whatcom	1	15,000
Total	24	773,236.79

*Coke, 15,000 tons.

RECAPITULATION.

Total number of tons of coal mined during 1890	773,236.79
Number of fatal accidents	6
Number of tons for each life lost	128,872.79+
Number of non-fatal accidents	10
Number of tons mined for each non-fatal accident	77,323.67+
Number of employes inside	1,504
Tons mined for each employe inside	514.12+
Number of employes outside	327
Total number of employes inside and outside	1,831
Tons mined for each employe	417.74

REPORTS OF COAL MINE INSPECTOR.

SECOND DISTRICT, 1895.

TACOMA, WASH., January 6, 1896.

Hon. James H. Price, Secretary of State of Washington:

DEAR SIR—I have the honer of submitting to you my annual report as coal mine inspector of Second District of the State of Washington, for the year ending December 31, 1895.

Trade has been very dull during the year. A number of small collieries have been partly or totally closed, although the number of tons of coal shipped in the district has increased. During the past four years there has been an increase each year over the previous one. This year the increase is due to the large shipments from the Carbon Hill colliery.

There have been five accidents in the district resulting in the loss of life. A descriptive record of them will be given in this report.

The number of tons of coal shipped or sold at colliery, 447,951. An increase over 1894 of 31,187 tons; an increase over 1891 of 160,438 tons.

The number of tons of coal mined per life lost is 89,591⅗.

Number of tons of coal mined per life lost during four years, 138,935¼. Which record can be considered very good.

Yours respectfully, JOSEPH JAMES,
Coal Mine Inspetcor of Second District.

THE PRESENT CONDITION OF MINES.

The general condition of the mines of the second district is good. Nothing of importance has occurred during the year to greatly vary the condition from what has been previously reported. Those in charge of the mines are awake to the spirit of improvements, and several important ones were made the last year which will be mentioned in this report.

The most important mines in the second district are those located in Pierce county. These mines are considered old ones in this state. Carbon Hill has shipped millions of tons of coal. It gives me pleasure to be able to state that up to the present time all the mines in this county are free from mine fires. This condition can be attributed to the method employed in working this coal field.

There is also better organization, or, in other words, a better discipline displayed than in any other section of the state where I have been. This does not, by any means, convey the idea that there is no room for improvement.

Wherever steam is carried into the mines, the steam pipes in every instance are thoroughly covered with asbestos felting to prevent, as far as possible, the radiation of heat.

Great care is used in keeping the pump houses clean, and the pump men are furnished with protected lights, either electric or lanterns. All such precautions help to lessen the possibility of conflagration.

The method employed in working the coal is one in which all the coal is removed as the mine advances. The methods of attacking the seams differ in the different mines. The Carbon Hill has been working on these lines for the last ten years or more, so it is not a new experiment. The sooner the whole state will adopt some method of long wall retreating the better it will be for all.

The greatest mistake we have made in this state is that we have adhered too closely to the methods employed in working the anthracite coal field of Pennsylvania. A little consideration would have prevented us falling into this trap, but we did not stop to consider. The time will soon come when everybody will be willing to abandon these methods, except where the surface conditions are such that we are compelled to keep it up. For example—working under large bodies of water, or cities—then we must sacrifice large bodies of coal. I refer to the method of breast and pillar, or pillar and stall, as the method is called.

In every system of mining, no difference which we adopt, we are supposed to work all the coal. If we fail to do this our method is defective, and the coal we have left in the mine is continually a source of danger. In the majority of cases that have come under my observation in this state where breasts are worked, the expense of removing the pillars is greater than the value of the coal, when this is done with absolute certainty that all the coal will be removed. No other condition should be accepted. The danger is too great.

Everyone knows that this condition does not exist in the anthracite coal field of Pennsylvania. In that field millions of tons of coal have been buried under caves without any bad results. No mine fire can be traced to that cause.

The anthracite coal basins lie in the valleys and are modeled accordingly. The coal crops out in the hills on both sides of the valleys. If a line is stretched across one of these valleys from cropping to cropping, the center of the valley would be found often to lay 500 feet or more below this line. This great load taken off from the center of the basins makes it very favorable for working the pillar and stall method.

In the State of Washington the conditions are entirely reversed. Great depths are reached almost immediately. The limit of depth for pillar methods is placed by mining engineers at 2,100 feet. Below this depth some method of long wall must be adopted. In some instances this depth will be reached in this state on water level.

VENTILATION.

An adequate quantity of air circulating through a mine is recognized as one of the safeguards of coal mining.

The lives of all the men employed under ground depend on a steady current of air flowing through the working faces so as to remove and render harmless noxious gases and foul atmosphere. The question as to the amount of air necessary does not admit of an answer.

It has been the rule in the past to select one man as a unit of calculation, and some writers have made additional allowance for mules and lamps, and then to allow so many cubic feet for every man and mule employed under ground. Estimates based on such lines are mere guess work. The amount of air necessary for the support of life is insignificant, only 28 cubic feet per hour or half a cubic foot per minute, and the same amount for a man's lamp.

Large quantities of air are required to dilute the gas that comes from the coal so as to render it harmless. If the gas was given off from the coal with regularity so much per square foot of face, a correct estimate could be made as to the required quantity, but such is not the case; consequently it requires considerable experience to manage gaseous mines. It is now considered an acknowledged fact that it is wrong to stipulate a minimum quantity of air in the mine laws.

Taking everything into consideration, the mines of the second district are well ventilated, as Table I shows.

TABLE I.

Name of mine.	*Area in sq. ft...*	*Velocity in feet per min...*	*Quantity in cubic feet.....*	*No. of men on one shift.....*	*Remarks.*
Carbon Hill......................	49	520	25,480	60	429 cubic feet per man.
Tunnel No. 4......................	16	200	3,200	......	Face of middle counter.
	20	400	8,000	......	Pillar split.
	24	250	6,000	......	Inside chute 50 ft. from face of gangway.
	2	210	420	......	Face of gangway.
	48	550	26,451	......	Outlet.

Tunnel No. 4 is well ventilated. There are three tunnels more in operation by this company, which are equally well ventilated. In all the other mines the vetilation is satisfactory.

A very novel method is employed in the Carbon Hill mines of ventilating the inside chutes, which are always troublesome in a gaseous mine. A hole 6 inches in diameter is bored from the gangway to the first cross cut, a distance of 30 feet, through the pillar of coal. This hole is made to ventilate the chute which is afterwards driven in the same place.

The machine used to do this work is the Howell's gear machine. It is somewhat modified by the superintendent to answer this kind of work. It is much more effective than air pipes and small fans; and for economy it is superior to them all.

RECORD OF COLLIERY IMPROVEMENTS FOR THE YEAR 1895.

CARBON HILL.

Mine No. 4.—A new inlet was made to this mine last year, which has cut off 2,300 feet of rubbing surface.

THE RE-BUILDING OF NO. 4 FAN.

This fan, in the place it stood before, was always in danger of being broken by rocks rolling down the side of the canyon. Such accidents had occurred from time to time. To place this fan in a safe position meant a great deal of expense. Over 300 feet of a rock tunnel had to be driven preparatory to the re-building of the fan on account of no room. Space is very valuable in this canyon. The tunnel is now the entrance to mine No. 4. The job of re-building the fan is very complete, and a neater one cannot be seen in the state. The fan is run by water as before, but can be coupled to a steam engine in a few minutes, if necessary.

Mine No. 7.—Two new inlets were made for this mine last year, also 200 feet of a rock tunnel driven through the fault.

Mine No. 5.—An inlet was made to this mine during the year. Five hundred feet of a gravel tunnel was first driven to the spot where the shaft was sunk.

Mine No. 6.—Sinking has commenced at this mine. The slope is down already 100 feet. Considerable work has been done around the mouth of the slope in cribbing to secure the side of the canyon.

Mine No. 1.—The first mine in the state to be lighted by electricity is No. 1 mine, Carbon Hill. The bottom of the slope and the turnouts, also the pump house and top of slope are lighted by this light. Sixteen lamps of sixteen candle power each have been placed at the different positions. If it was practicable to use this light throughout the mines it would be the means of lessening casualities considerably.

WILKESON COAL AND COKE COMPANY.

Four new inlets were made in this mine last year to the different seams. There has been a change for the better in the arrangement of double doors in tunnel No. 2. The old No. 2 counter has been reopened from the mouth for several hundred feet and boarded all around with double thickness of boards. A chute was driven to connect it from the lower tunnel. The double doors have been placed on the lower tunnel in the usual manner. The mouth of the old counter is connected with the fan by means of a large air box, which has been built very substantially. The whole work has been well done. The effect of this improvement is felt throughout this mine.

SOUTH PRAIRIE.

A new seam of coal five feet thick, of excellent quality, has been struck in the rock tunnel which was driven westward across the measures at a distance of 400 feet from No. 1. The distance from this level to the surface equals 700 feet, which is the height of the lift at this point. The second opening was completed early in the year. This discovery gives this mine a new lease of life. Also, 300 feet of a gravel tunnel has been driven in search for No. 4 on the outside, but thus far without success. Two 80-horse power boilers have been put in place.

One compound condensing duplex pump, size 12 in. and 20x10¼ ins., capacity over a million gallons in 24 hours, has been added to the drainage. This pump is placed on the second landing.

BOILER CERTIFICATES.

Boiler certificates have been received and filed from all the collieries where they are in use, stating that they are in good condition.

NUMBER OF INSPECTIONS MADE.

CARBON HILL.

Mine No. 4, six inspections.
Mine No. 7, five inspections.
Mine No. 1, five inspections.
Mine No. 6, five inspections.

WILKESON COAL & COKE COMPANY.

Mine No. 1, five inspections.
Mine No. 2, five inspections.
Mine No. 3, five inspections.
Mine No. 7, five inspections.

SOUTH PRAIRIE MINE.

Mine No. 1, five inspections.
Mine No. 2, five inspections.

All the other small collieries, four inspections each.

The mines that remained closed during the entire year are the Tacoma Coal & Coke Company, Pittsburg, Acme Coal Company and the Northwest Coal Company at Bucoda.

The number of new mines opened during the year are two, the Rosenthal mine at Chehalis and the Chehalis Coal Company at Chehalis.

DESCRIPTIVE RECORD OF FATAL ACCIDENTS.

Peter Piipo, age about 30 years, single, was killed in Mine No. 4, Carbon Hill, January 24, by fall of coal. The deceased was working in the second crosscut above the gangway, cleaning it out. The place where he worked was well timbered. Through some unknown cause he knocked out a set of timbers, which resulted in his death. He was a native of Finland.

David Thomas, aged 26 years, married, was killed February 27, at No. 4 fan, Carbon Hill. The deceased looked after the fans. He had entered No. 4 fan that morning for the purpose of oiling it. In some unaccountable manner his clothes got entangled in the shaft, which was revolving at the rate of 115 revolutions per minute. He met with a horrible death. He was a native of Pennsylvania.

William Edwards, aged 42, married, was killed in South Prairie mine May 27. At time of accident he was loading coal out of No. 9 chute in the new seam. This was the first opening made here. Unaware to anyone water had accumulated in the chute during the night. When Edwards opened the coal gate in the morning, the water came down with such a force that he was thrown over the coal car against the roof. The body was found in the ditch, covered with fine coal. It was recovered immediately, but life was extinct.

Thomas H. Barrett, aged 29, married, was killed July 31, at the Wilkeson mine. When the accident occurred, Barrett, in company with George Harvey, was working on the third counter, chute No. 6, mine No. 1. He was in the act of putting in a lifting brace, when a piece of the pillar gave way, and he fell with it a distance of 250 feet. When found he was dead. He was a native of England.

Joseph Angelina, aged 27, single, was killed in mine No. 7, Carbon Hill, in chute No. 38, August 27. Angelina was a chute starter. He and David Thomas had gone together to start chute No. 38, which was blocked fifteen feet above the second cross cut. Angelina went up to the blockade to put a shot on it. Thomas stood in the cross cut to show him light as he was coming down. The shot was made with a short time fuse. Instead of turning into the cross cut, he slid down, passing it. The shot went off almost instantly, and he was covered with the coal. The body was recovered at once, but life had gone. He was a native of Tyrol.

RECORD OF NON-FATAL ACCIDENTS.

CARBON HILL.

January 15.—John Ireland was injured by a fall of rock in pillar in mine No. 4.

February 25.—John Rowland was slightly burned by gas. He had neglected to put up his canvas.

April 4.—Daniel McMullen was slightly injured by a fall of rock.

October 28.—Mike Branish was injured by being burned by gas. This accident resulted from opening his lamp in a place where he should not.

WILKESON COAL & COKE COMPANY.

August 8.—John Smitch was injured by a fall of coal in No. 3 gangway; leg broken.

September 18.—Gus Winder was injured by a lagging falling through a chute and hitting him.

REPORT OF EMPLOYES, COAL MINED, DAYS WORKED, ETC., FOR THE YEAR ENDING DECEMBER 31, 1895.

Collieries.	*No. of tons of coal mined......*	*Average number of employes...*	*No. of men inside......*	*No. of men outside......*	*No. of boys inside......*	*No. of boys outside......*	*No. of days worked......*
Carbon Hill..........	303,087	475	352	90	11	22	276
Wilkeson Coal & Coke Company..........	85,688	180	129	47	2	2	286
South Prairie..........	47,626	102	77	90	....	6	156
Ouimette..........	300	4	....	....	....	....	....
Eureka, Centralia..........	9,050	8	....	....	....	....	....
Florence, Centralia..........	1,300	3	....	....	....	....	....
Rosenthal, Chehalis..........	700	6	....	....	....	....	....
Chehalis Coal Company..........	200	3	....	....	....	....	....
Total..........	447,951	....	....	....	....	....	....

12,736 tons of coal were made into coke at Wilkeson.

SECOND DISTRICT, 1896.

TACOMA, WASH., Jan. 6, 1897.

Hon. James H. Price, Secretary of State, Olympia, Wash.:

SIR—In compliance with the ventilation act, approved March 5, 1891, I have the honor to submit to you my annual report as inspector of mines for the Second District of the State of Washington. In submitting my report I wish to make a few remarks.

To the majority of the citizens of the state a coal mine is the same, no matter what state it is in. My aim is to point to some of the difficulties of this state, which are more numerous here than in any other state in the union.

The report touches on the geological disturbances of the fields and thickness of coal seams. This is done to acquaint our legislators with the existing conditions, so as to prevent, as much as possible, such demands as those made during the last session. The sizes of the openings are such as have been determined by experience, and not the idea of any individual. It is useless to state that we cannot alter them to meet the demand of any measure. The report also treats of the methods of mining.

When the miners of this district will realize that this coal field is different from any other field in the United States, and that it is useless to borrow the experience of other coal fields, then there will be a turning point in our mining.

It has been in accord with the sentiment of the state for twelve years at least, when reference was made to the coal fields, to compare them with Pennsylvania, and so closely have we adhered to that state that our methods of mining, in the majority of cases, is the same as that employed in the anthracite coal field, which ours somewhat resembles, inasmuch that the measures dip, and that is all. This is not due to a number of great men from that state coming to manage our mines. All the Englishmen, with but one exception, to my knowledge, who have come here direct from England, where different methods are employed, have followed our method of mining. One of the managers from that country started a long wall advancing, but he made the mistake of gobbing the fine coal instead of loading it out, which soon resulted in a mine fire. The best methods of mining in this district are those which have been introduced by men who have had large experience in metalliferous mines as well as coal mines. It is not generally understood that the safety of the coal mines increases with the completeness. We can remove the coal, and if it were possible every pound of it should be taken out. This idea should be kept continually in mind.

Ventilation is also treated in the report. The majority of our mines are well ventilated, as the report will show. For the benefit of those who are imbued with the idea that an increase in the quantity of air cures every evil, I might state that there is such a thing as too much air. A miner when working hard perspires freely. The velocity of the air is very swift in the majority of the mines of the district, and if the miner rests for a few minutes he is chilled. It is not an uncommon occurrence to find a canvas turned up, and when the miner is questioned relative to this breach of discipline his answer is, invariably, "I cannot stand the current," which is very true.

Spontaneous combustion of coal is the next subject under consideration, which is very meagerly understood. It is of such importance to those engaged in working coal mines in this district that it will pay to study it thoroughly. We cannot make any changes in our methods of mining until we first understand this subject.

Lighting of the mines is next discussed. We have not yet reached that stage in our mining when we need fear our present safety lamp. We use the same class of lamps that are used all over the United States. The subject was mentioned lest a demand is made for more air as a means to cope with it, for we cannot enlarge the airways to answer slow velocities. The velocity of the air at present is much above what was demanded by a bill introduced last session. The lamps mentioned in the report have been proven to withstand velocity of 53 feet per second, or 3,180 feet per minute, without injury. How much more we cannot tell, but this is more than sufficient to the comfort of any man.

Other subjects will be slightly treated in this report. A description of the fatal and non-fatal accidents will be given in it, and also the usual tables. Yours very respectfully,

JOSEPH JAMES.

PRESENT CONDITION OF MINES.

A glance at the beautiful snow-capped mountains which stand as sentinels on either side of the Puget Sound coal basin is sufficient to convince any person of the geological disturbances which have occurred in the interior of this coal field. It is my duty to point to this because it is one of the greatest difficulties those who are engaged in the bowels of the earth exploring the interior of the coal field have to encounter. Besides being crushed and broken into fragments, our coal measures belong to the top leaf in the book of creation.

These great disturbances are felt in a great degree in the Wilkeson coal field. More timbers are used in it than any other district in the world for the amount of coal mined.

On an average more than a thousand pieces of timber are used for every 400 tons of coal. This statement will apply to all the mines in the Wilkeson coal field. To be able to handle this large quantity of timber on the pitch, advantage is taken of the law of gravitation, and passages are built to slide the timbers to different localities in the mines. A similar statement has been made in a previous report, but necessity compels me to state it again. Mining is a dangerous occupation when properly carried on, but if any looseness is allowed to creep in, danger increases rapidly with it, and, contrary to the set notions of a great many people, the profits decrease. A better evidence that our mines are worked on a firm business principle cannot be produced than the fact that they show increase in their production in the last three years, a period during which the business of the whole country was paralyzed.

MINING PLANTS.

The mining plants we have are good. Few of the hoisting engines have been recently built and are excellent plants. Where we excel is in our pumping and coal washing machinery. Our ventilators are all of the Guibal type, which used to be the best type of fans for such fields, as these were used before the Eopell was invented. They are almost all the same with this exception, that some take air on both sides and are run by water power, while the others take in air on one side and are run by steam engines.

METHODS OF MINING.

In the district there are two methods employed, each coal field having a different one. In the lignite field the breast and pillar is exclusively employed. The method as practiced is not adapted to the field, and fires result. None of the mines yet have reached any great depth. Enough experience has been gained to prove that it is foolish to follow on the same line. Yet when greater depths shall be reached these conditions will be greatly aggravated. To be able to determine the best method of mining all grades of coal require a ripe experience. It is a subject that generally is handled by mining engineers. It also requires great familiarity with the existing conditions of the coal fields, and it has been the history of every field that considerable time has elapsed before the right method was hit upon. I feel rather delicate in assuming the responsibility of even suggesting a method of working such fields as our lignites. But I have given the subject some thought, and my experience is embodied in these few remarks. Several of the mines could be worked profitably providing that a sufficient sum of money is put out to carry the narrow work to the boundary first, and then work backwards.

There are other seams which we could not work that way. It depends on whether the coal carries clay veins or not. The expense of maintaining a gangway open for a mile or more in a coal seam that carries clay veins is very great indeed, because the pressure caused by the swelling of the clay, which absorbes moisture rapidly, is such that no timbers can stand it. The only method of working such seams is to drive in the sand rock. The tertiary sand rocks are very soft. The tunnels could be made at a suitable distance away from the seam, which could be tapped at will. This method would be less expensive than the one practiced, in the long run, beside having the advantage of a safe retreat, and keeping mine fires under control.

For all seams above six feet thick, pitching more than forty degrees, this method of filling is admirably adapted, especially if the surface is covered with thick sand and gravel drifts. The method is worthy of the consideration it requires. It will have several advantages over our present method. First, it is a safer method; mine fires would be a thing of the past; at least 30 per cent. more lump coal would be obtained. The disadvantages are not worthy to be taken into consideration, for it is folly to attempt to work breast methods on such pitches in lignite mines.

SPONTANEOUS FIRES.

The spontaneous combustion of coal is one of the greatest drawbacks we have in this district in working this class of coal. It has been an expensive item in mining already. A few remarks on this subject will be justifiable if it was for no other purpose than to give some idea of its cause to a class of citizens who are not miners.

The theory generally believed by miners of the cause of spontaneous combustion of coal is that it is due to the oxidation of pyrites. This theory has been shown to be erroneous, and that the pyrites have no heating effect. It is now known that carbon is the one element which shows the greatest influence in the heating action. The degree in which it acts to condense gases depends on the fineness of the division of the carbon. The coal being made up principally of the element carbon, it absorbs oxygen readily. This gas, after being compressed, becomes chemically very active, and combines with the carbon of the coal to form carbonic acid, and with the hydrogen to form watery vapor. This phenomena is always noticeable when a breast full of coal heats. A cloud of steam overhangs the surface of the coal and the same is covered with a watery vapor like dew.

The lignite and the semi-lignite coal are very susceptible to heating. The phenomena never shows itself in a newly dug pile of coal, but no sooner do we commence to pile it, as we are compelled to do in a pitching breast, than it shows itself at once. The coal in the breast has to be stirred, which is done by loading some of it out. The process lowers the temperature by allowing air to travel through the coal, and further heating is prevented for the time being. In flat workings, heating never occurs in piles of coal dug by a miner at a face, even after the mine has been idle for a considerable time, as long as the ventilation travels through the face which keeps down the temperature. In this class of workings, spontaneous fires originate in gobs where the refuse of the seam has been stored. It is impossible to ventilate these gobs. The best method of watching the combustion that takes place in them is to place iron rods at intervals here and there, which rods are examined daily for the amount of heat. This is done until the section is worked out and sealed up. Moisture makes things much worse. It increases the action of the absorbed oxygen upon the hydrocarbon of coal. A wet breast always causes a serious increase in the heating; so it is impossible for us to put out fire by drowning a mine, as they do in every other state. No sooner will we pump the water out, till the air striking the coal fires it again. Another point is that the mine should be kept as cool as possible, for any rise in the temperature quickens the chemical action.

BITUMINOUS FIELD.

The method of working this coal field is one kind of long wall retreating. It is doubtful if a better method can be employed. The only one that suggests itself is the method of filling. The surface is covered everywhere with deep deposits of gravel, which could be utilized to fill behind the miner. A cheap method of handling it must be found before we can do this. In several of the European countries this method is in vogue, this debris being mostly handled by female labor, which is very cheap. The thick iron ore deposit of Lake Superior, and probably a few metallic mines, are the only mines in the United States where this method is used. This field, in the near future, is going to be rapidly developed. The coal is already used in the trans-Pacific commerce, and has proven itself a rival to the cheap coal of Japan. It is also partially used on two of the trans-continental railways. Excellent coke is made from the product of this coal, which will carry great influence in the development of the state when iron works, smelters and factories will be built. Such institutions are generally located where the fuel is. There is plenty of this coal waiting for capital to develop it. What impresses a stranger most is the manner in which this field has been broken and twisted into every conceivable shape. Such disturbances exert great influence on the methods of development which we cannot overlook. To make the openings larger than they are would not be safe or profitable. Timbers as large as 18 inches through are used in some instances to keep up the gangway, and these are not, by any means, too large. In each of the tunnels there are from two to four men working nights on the repairs. It is safe to say that each tunnel is largely retimbered once a year. The majority of the coal seams are thin. The average thickness of seams that are worked at present is not over five and one-half feet in the aggregate, and there are a great number of seams which are not over three feet thick.

REMARKS ON THE CONDITIONS OF BOTH FIELDS.

We cannot expect large airways under the conditions described in these two fields such as are provided in Pennsylvania, in the thick seams of the anthracite coal field, where one can ride on horseback from face of gangway to bottom of shaft; consequently, if we are to furnish the same quantity of air per man, the velocity of the air in the mines of this state will be considerably greater than that of the mines of Pennsylvania. It is therefore foolish to make laws which base the speed at the rate of 360 feet per minute, or 6 feet per second, a safe speed for the Davy lamp against passing the flame, a lamp that has outlived its usefulness. The English Royal Commission on accidents in mines, which was composed of the most practical, as well as most scientific, men of that country, pointed out the grave defects of this class of lamps over eight years ago. Since then, one defect after another has been removed. To-day we have lamps which have passed the stage of experiment. The Evan Thomas No. 7 and the Marsaut, for working at the face, and Apple, White & Grey, for testing purposes, are worthy to be classed as safety lamps. The last mentioned has been introduced in the Carbon Hill mine. In the mines of Prussia, which are very similar to our own, the velocity of the currents are fixed by law in the following manner: Where the section of the airways are dependent upon the quantity of air necessary for ventilation of the whole mine, including the different splits, the amount of air is calculated upon the velocity of 13 feet per second for fresh air currents, and 22 feet per second for return air currents.

VENTILATION.

This subject is better understood year after year. The great mystery that used to surround it has disappeared. The laws that govern the circulation of air through the underground passages are more generally comprehended than at any other period in the history of mining. The greatest difficulty experienced to-day by mining men is the need of a practical instrument that will measure the quantity of gas that is given out in a mine. The instrument needs to be simple, one that can be handled by a miner. Several such instruments have been patented, but only one of them has become famous. The Shaw is a perfect instrument, but it is too cumbersome and expensive to be of practical use in mining. It has to be kept in an outside building and the mine air carried to it in rubber bags. This instrument is invaluable in testing the air in public buildings, such as factories, etc. Until such an instrument is obtainable, the amount of air necessary to circulate through a mine from day to day depends on the good judgment of the men in charge. We have no means of ascertaining the quantity of gas that escapes from the coal until it reaches its explosive point, which is one in ten. The safety lamp gives us the first warning. For a law to state that a certain quantity of air should circulate through a mine, is no safeguard against mine explosions. Mine No. 1, at Carbon Hill, gives out gas freely, and there is over 600 cubic feet of air per man circulated through it. If it was thought necessary, the ventilation could be increased.

The great question to confront us in this state is, how to force or exhaust great quantities of air through small mine orifices. This has been solved in the Capell fan. This type of fan is built for high water gauges, if necessary as high as twelve inches, which means a pressure of 62.4 lbs. per square foot, or a total of over a ton and a half on an air course of fifty square feet area. This type of fan is worthy the attention of operators. It is, without a doubt, the most suitable for this state.

While discussing the subject of ventilation, a few remarks on the subject of measuring air will not be out of place, for it has been considerably discussed during the last two years. Not one miner in every three hundred, with the exception of the officials, knows how to measure it; therefore, it cannot be expected that the public is in any way acquainted with the subject. The method of measuring the pressure is mistaken for the method of measuring the quantity.

We can measure the pressure in a place where there is no movement in the air. It is governed by the laws of statics. Quantity cannot be measured in the same manner because it is governed by the law of dynamics, and we must have movement in the air before we can measure the quantity that will pass through a given space in a given time.

The instrument used in measuring air is called the anemometer. There are several kinds, but the mechanical contrivance of all the American instruments is like the works of a clock, and the motion is given to it by means of a little fan which is made to revolve by the air, and the velocity of the air is registered on a dial in feet per minute by means of a pin.. This machine, like every other machine, is subject to the laws of friction. The amount necessary to counteract this law is about 30 feet per minute, which is added to the velocity registered on the instrument. The air must have a movement above 30 feet per minute before we can measure it. In places which have large areas, like pillar work, which often have an area 60 x 6 = 360 square feet, large quantities will pass over the face which cannot be measured at that point. Let us take the area given and the velocity of 30 feet per minute, which we cannot measure, as stated; now let us see what quantity will pass over the face—360 x 30 = 10,800 cubic feet per minute. The way that quantity is measured is at the nearest cross cut, the area of which will be not over 25 square feet, and the velocity of the air will at that point be $\frac{10800}{25} = 432$ feet per minute. The quantity necessary to counteract the law of friction is ascertained by the maker and is given with each instrument. It is pasted on the cover of the box for the use of the operator. Whenever this subject is incorporated in a law it is always read at or near the face for the reason stated.

COAL DUST.

This subject is of vital importance to the coal miner. It has been the means of great calamities in the past, which we should avoid as much as possible in the future. Whenever this danger makes its appearance on gangways the cause should be removed by wetting. It is useless to go into details to prove that dust is a factor of danger in coal mining. The governments of England, France and Germany have done this for us and spent millions of dollars in proving it. In some instances miniature coal mines were built on the surface and dust scattered over the passages so as to resemble the inside workings as much as possible. Windows were placed here and there so as to enable the study of the propagation of the flame. Shots were then fired to resemble a blow-out shot and every kind of dust was exploded with the exception of anthracite dust and lignite dust, which were supposed to be free. The dust of lignite has been proven to be explosive in this state as well as in California, and so poisonous is the after-damp of such explosions that persons partly overcome by the same seldom recover.

ACCIDENTS.

To record accidents is one of the most unpleasant duties of an inspector, and the most important. Each accident has a significance which is studied more thoroughly than people generally think. A new coal field is always more fatal than older fields, for this expensive experience is not immediately gained. The idea that a man costs nothing is not worthy the nineteenth century. An accident, no matter how trivial it may be, is more expensive than though nothing occurred. Mines where few accidents occur are more profitably worked than those which are recklessly managed and a great many people killed, if the conditions in the two mines are alike. So it is absurd to say that a man is killed to save money, which is the meaning of the old adage.

Ignorance is the cause of the greatest number of accidents. Experience and education are the only remedies. A great many of the so-called accidents are really not accidents. In this district we have been very fortunate during the last five years, in not having many of them.

The average amount of coal mined during that period for each life lost is a little more than 160,000 tons.

This year it is 429,988 tons per life lost. I doubt whether this record can be improved. It compares favorably with the best sections of the states.

The number of the complete inspections made of the mines of the Second District were five. This does not include partial inspections where accidents have occurred. These places were visited only so as to gather all the information possible in regard to the same. The condition in which these mines were found was, as usual, very good. This does not imply that there is no room for improvement; no, indeed, the science of mining has made such rapid advancement in the last fifteen years that to keep pace with it means a considerable outlay of money. It is a pleasure to state that we are by no means behind the times.

THE SOUTH PRAIRIE MINE.

This mine generates practically no gas at present. Mining of coal is carried on almost entirely in mine No. 1. A piece of coal had been left from the middle level to the surface, a distance of about 800 feet. The coal stands between two parallel faults, the distance between them being about 1,800 feet. Two connections have been made with the surface by two airways, one driven at either end. The outside one is closed for the present. One thousand four hundred and ten cubic feet leaked through the stopping, which is utilized to ventilate the two breasts on the outside. The average thickness of coal is less than three feet. It is of excellent quality. The great trouble in this mine is that the bottom is very soft, and naturally it heaves, thus making it very troublesome in keeping open the cross cuts. The system of working the coal is the breast and pillar. Other systems have been found impracticable for this seam. The cause is *soft bottom.* Naturally the air current is very swift and the miner feels it keenly, and everybody is satisfied with the ventilation (see Table I). The total quantity could easily be increased at an expense of the same power, by opening the outside aircourse and by compelling the miner to keep the board wings down. In every breast the distance from top of board to roof was less than a foot. No objection has been made to this, for each place is well aired. Other conditions in the mine are equally good. The drainage is excellent, which is accomplished by means of three steam pumps. The pump house is looked after very closely and combustible matters are removed. Communication between top and bottom is carried on by means of an electric bell and telephone, which were found in order. The traveling ways also are in good repair. The indicators were found to be correct, and the ropes apparently were in good condition. The safety valves were found in order. The boilers have two sets of water gauges. Each set was found in working order. The glasses of the steam gauges are kept clean.

VENTILATION OF THE SOUTH PRAIRIE MINE.

The quantity of air entering the mine is, in cubic feet	18,803
Air passing over the miner	10,649
Number of men in one shift	45
Quantity of air per man in one shift	236
Quantity of air displaced by fan	23,000

DISTRIBUTION OF THE AIR.

	1st split	2d split	3d split	4th split	No. of breast	No. of men	Air per man
First group of breasts	5,114				1	2	4,110
" " "	5,114				2	2	3,114
" " "	5,114				3	2	1,414
" " "	5,114				4	2	1,405
" " "	5,114				5	2	900
Middle " "	5,114				1	2	3,142
" " "	5,114				2	2	2,213
" " "	5,114				3	2	1,142
" " "	5,114				4	2	960
" " "	5,114				5	2	670
" " "	5,114				6	2	800
Outside " "		1,410			1	2	1,312
" " "		1,410			2	2	1,214
Mine No. 4, gangway			4,125		1	2	2,112
" " "			4,125		2	2	1,964
Bottom of slope, pumphouses and stables				8,154			

MINE NO. 1, CARBON HILL.

This is the best ventilated mine in the district. A more thorough distribution of air could not be desired. The total quantity of air entering the mine is 33,343 cubic feet per minute, which is distributed as follows: The quantity of air entering the pillars, 13,236 cubic feet per minute; the quantity entering the narrow work, 12,264 cubic feet per minute; the number of men on one shift, 48.

The quantity of air per man entering the mine, 652 cubic feet; 2,000 cubic feet is allowed for mules. At the following individual points air was measured:

Pillar 51, 900 cubic feet, 2 men.
Pillar 52, 1,112 cubic feet, 3 men.
Pillar 53, 3,451 cubic feet; 2 men.
Pillar 54, 2,103 cubic feet, 2 men.
Pillar 55, 1,417 cubic feet, 2 men.
Pillar 56, 8,120 cubic feet, 2 men.

Such a method of measuring air does not convey the idea that all the air was measured. Some of the pillars were fed by two or more cross cuts. The ventilation of the narrow work from natural causes must be good. The least measure was 451 cubic feet per minute, and the greatest quantity 2,451 cubic feet per minute. One man in each chute. The quantity of air in inside chute at face of gangway, 2,280 cubic feet. This quantity could be increased three times if necessary. The chutes from gangway to first cross cut are ventilated by a bore hole five inches in diameter which is bored through the pillar before each one is started. A fresh split of air is used to ventilate the bottom of slope, pumphouse and manway. The quantity that travels through these places is 7,843 cubic feet per minute. The quantity displaced by fan is 34,300 cubic feet per minute. Water gauge, 0.8 inches.

The thickness of coal is about five feet. The air current is swift. The system of working is one kind of long wall retreating. Timbering in the pillars was found to be substantially done, as usual. The cogs are well wedged and good thick cap pieces are universally used on props.

The drainage of the mine is excellent, which is accomplished by means of a Dow pump, which has a capacity of a million gallons a day. The pump house is kept clean, being washed twice a week.

It is lighted by electricity. The turnouts at bottom of slope are also lighted by the same light. Communication between the top and bottom was found in order. This is done by means of a speaking tube and electric bell. The ropes are good. The hoisting plant is new. Its capacity is much in exces of the present need, brake and indicator in working order. The boiler capacity is also in excess of its present need.

Water gauges, two sets on each boiler, in good order. Safety valves and steam gauges, the same. Everything around this plant is well kept.

MINE NO. 4, CARBON HILL.

The quantity of air entering this mine is 25,480 cubic feet. It is distributed as follows:

The quantity of air entering the pillars, 11,400 cubic feet.

The quantity of air entering the narrow work, 14,080 cubic feet.

The number of men on one shift, 50.

The quantity per man, 488 cubic feet.

1,000 cubic feet of air allowed for mules.

Air was measured at the following points:

Chute 51, 2,421 cubic feet, two men.

Chute 52, 1,142 cubic feet, two men.

Chute 53, 2,412 cubic feet, two men.

Face of first counter, 1,960 cubic feet per minute, one man.

Pillar 39, 2,265 cubic feet per minute, two men.

Pillar 41, 2,400 cubic feet per minute, two men.

Pillar 42, 1,478 cubic feet per minute, two men.

Pillar 43, 1,874 cubic feet per minute, two men.

Chute 48, 1,120 cubic feet per minute, one man.

Chute 49, 1,242 cubic feet per minute, one man.

Chute 53, 2,148 cubic feet per minute, one man.

Chute 57, 5,400 cubic feet. (57 is the inside chute at face of gangway.)

Face of gangway, which is ventilated by means of two air pipes 8 inches by 10 inches, 351 cubic feet, two men.

The quantity of air displaced by fan, 27,620 cubic feet. Water gauge, 1 inch.

Other conditions in this mine were good. The timbering of the pillars is excellent. The traveling ways are in good condition, cogged on both sides almost the entire length of the lift. (Cog is a crib work built of props 5 feet long by 6 inches through, or 7 feet long by 6 inches through.) Steps are placed every two feet. The mine is above water level, so the drainage is natural.

MINE NO. 7, CARBON HILL.

The quantity of air entering this mine is 21,456 cubic feet; 2,000 cubic feet allowed for mules.

Number of men, one shift, 47.

The quantity of air per man, 414 cubic feet.

Air was measured at the following points:

Inside chute at face of gangway, 5,865 cubic feet.

Face of gangway, ventilated by a pipe, 342 cubic feet.

Two men working at the face.

Second cross cut, 990 cubic feet, one man.

Pillar 13, 2,150 cubic feet, four men.

Pillar 14, 1,941 cubic feet, two men.

Pillars 15 and 16, 3,150 cubic feet, 4 men.

The quantity entering the pillars is over 8,115 cubic feet.

Chute 24, 1,560 cubic feet, one man.

Chute 25, 1,642 cubic feet, one man.

The quantity displaced by fan is 23,200 cubic feet. Water gauge, 0.7 inch.

This mine also is above water level. The other conditions in this mine are good. It is a troublesome mine to keep open. The immense amount of timber used in Nos. 7, 4 and 1 is unusual. There is no other coal mine in the United States that uses one-half as much. Mines Nos. 5 and 6 also are in equally good condition. Nos. 1, 4 and 7 generate gas, and are worked by safety lamps. No. 5 generates a little gas.

WILKESON MINES.

The quantity of air entering the mine is 25,460 cubic feet; it is distributed as follows:

10,450 cubic feet enters No. 3 mine.

6,630 cubic feet enters No. 3 narrow work.

3,820 cubic feet enters No. 3 pillars.

9,450 cubic feet enters No. 2 mine.

5,240 cubic feet enters No. 2 narrow work.

4,210 cubic feet enters No. 2 pillar work.

3,000 cubic feet enters No. 7 where a rock tunnel is in progress.

The quantity displaced by fan, 32,454 cubic feet.

Average number of men working on one shift in all the places, 80.

The quantity of air per man entering the mine, 318 cubic feet.

This mine generates but little gas at present.

The system of working the coal is the long wall. The mine is kept in good condition. A little trouble was experienced lately by a squeeze on No. 3, which has been brought thoroughly under control.

The mine is above water level, and the drainage is natural.

The condition of the other mines in the district are not bad taking into consideration the irregularity of the market, which causes them to be idle a considerable portion of the time. The mines of the Wilkeson coal field are on a high plane, and we need not fear to compare them with mines of older states, notwithstanding that we have difficulties to contend with that miners in older formations have not.

COLLIERY IMPROVEMENTS.

The new slope on the No. 6 seam, Carbon Hill, is finished. It has a depth of over 400 feet. The bottom turnouts also are completed, making, in all, a very neat piece of work. The drainage is incomplete, but the sump is made. A gangway has been started north. An air course has been driven parallel with the slope. A hoisting engine has been put in place; size, 2x14′x24′; gear, 5 to 1. Two new boilers have been put in place and boiler and engine houses built.

The difficulties to be encountered in securing the mouth of this slope and the plants were great. The immense amount of timber used in cribbing and other work cannot be realized until it is seen.

No. 4.—Five hundred feet of gravel tunnel has been driven.

No. 7.—A rock tunnel of 600 feet, which is utilized as an intake to it, has been driven. This tunnel will be continued along the cropping of No. 7 seam. It is located in a dirt seam 25 feet east of No. 7 and under the same. Connections are made at so many hundred feet with No. 7 workings.

WILKESON MINE.

Two hundred and one feet of a rock tunnel has been driven from No. 7, and 90 feet of rock tunnel in No. 2.

New inlet to No. 2, 300 feet long, through rock and gravel.

New inlet to No. 3, 150 feet long, through gravel.

A NEW MINE.

This mine is located three miles west of Castle Rock, on sec. 7, township 9, 2 west. It has been opened on the southeast quarter or thereabouts. A mine track is almost built to the Cowlitz river, where the coal will be shipped on scows.

Developments will soon start on the Coweman creek, three miles east from Kelso. Machinery is already on the premises, and the contract let to sink. The coal seam is about five and one-half feet thick, bituminous in nature. The location is on section 30, township 8, 1 west.

Considerable work has been made on section 26, which place is located about five miles southeast from Carbonado, on the Carbon river. A substantial opening is in progress, and has been driven several hundred feet. The tunnel will cut several bituminous seams of good quality. A railroad has been located to the mine. It connects it with the Orting branch of the Northern Pacific.

FATAL ACCIDENTS.

May 16.—Fred Omen was fatally injured at Wilkeson mine by explosion of dynamite. Miners know very well the extreme danger of heating dynamite in a lamp, yet for the sake of saving a few minutes time the error is repeated. The number of men that have been killed in this manner is very great. Omen died that night. His hands were blown to shreds, and his body was considerably disfigured. He was a married man, leaving a wife and child to mourn his loss.

September 4.—Max Jarvola, single, was found dead in No. 1 mine, Carbon Hill. I was at Carbonado when this occurred, and visited the place where Jarvola was working before the body was removed. He was working in a cross cut which was driven about 10 feet, and had fallen with his head outward. A post mortem examination was held but the cause of death could not be determined.

NON-FATAL ACCIDENTS.

CARBON HILL.

January 5.—Dominic Berry was slightly injured by cutting himself with an ax.

January 16.—August Raisin was injured in mine No. 7 by a fall of rock; arm broken.

March 5.—Timothy Bryan was injured in mine No. 1; cut him- elf on the arm with an ax.

March 12.—Thomas R. Roberts was slightly injured in mine No. 1 by fall of coal.

March 22.—David L. Thomas was injured in mine No. 5; collar ne broken by fall of rock. He was aware that the rock was loose.

April 12.—August Raisin was injured by fall of rock in No. 7; m broken.

May 18.—Victor Davidson was injured in mine No. 7 by bottom ck coming loose and sliding down the pitch; leg broken.

June 15.—David Morris and Charlie Martula were burned by an plosion of coal dust and air ignited by a dynamite blast in mine No. 7.

June 22.—Oswold Summer was injured in mine No. 1 by prema- re explosion of dynamite; he lost both eyes.

July 3.—Jacob Rossetti was injured in mine No. 7 by fall of ck.

July 22.—P. Curlis had his arm broken by a fall of rock in mine No. 7.

August 19.—William Richards was slightly burned by gas while ring a shot.

October 5.—James Houding was injured on back by fall of rock mine No. 5.

WILKESON MINE.

March 22.—Calab Carlson was injured on the leg; squeezed be- een a car and a door.

July 7.—Marvin Melrose Hoskin was seriously injured while rting a chute. He was carried away with the debris and almost othered in sand and mud. His companions, Lemon and Koyme, aped with slight injuries.

December 4.—John Hosking was injured on the foot by being ueezed between a car and a chute.

December 28.—Fred Detrich was injured by cutting himself with ax.

SOUTH PRAIRIE MINE.

May 7.—Wm. Nikula was injured; his collar bone was broken being squeezed by a car.

September 6.—R. Hayden was slightly injured by fall of rock.

TABLE II.

Collieries.	No. of tons of coal mined......	Av. No. of employes ...	No. of men inside......	No. of men outside.....	No. of boys inside......	No. of boys outside.....	No. of days worked.....
Carbon Hill	297,000	478	325	125	10	18	[illegible]
Wilkeson Coal & Coke Co	88,480	219	165	51	3	2	[illegible]
South Prairie	37,006	100	68	25	1	6	[illegible]
Ouimette	300	3	....	....	....	....	....
Chehalis Co. No. 1	2,000	8	....	....	....	....	....
Chehalis Co. No. 2	141	2	....	....	....	....	....
Castle Rock	1,141	8	....	....	....	....	....
Kelso	3,220	14	....	....	....	....	....
Totals	429,288	832	538	201	14	26	[illegible]

The amount of coal made into coke at Wilkeson this year is 20,967 tons.

Florence Mines, Nos. 1 and 2, which were in operation in 1895, were closed in 1896. These mines are located at Centralia. Boiler certificates are filed.

Since there has been a record kept of the tonnage of this district, there has been an increase each year until 1896, when there was a decrease of 18,663 tons. It was due to floods and other calamities.